

y_{ci} = the vertical distance between the centroid of each pixel and the upper edge of the image, in

$$= \frac{1}{yres} (y_i - .5) \quad (3)$$

5 y_c = the vertical distance between the upper edge of the image and the centroid for the aggregate shape, in

$$= \frac{\sum_{i=1}^n A_i y_{ci}}{\sum_{i=1}^n A_i} \quad (4)$$

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$$= \frac{A \sum_{i=1}^n y_{ci}}{nA} \quad (5)$$

$$= \frac{1}{n} \sum_{i=1}^n y_{ci} \quad (6)$$

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$$= \frac{1}{n \cdot yres} \sum_{i=1}^n (y_i - .5) \quad (7)$$

d_{yi} = the vertical distance between the centroid of each pixel and the centroid of the aggregate shape, in

$$= y_{ci} - y_c \quad (8)$$

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I_{cx} = the centroidal moment of inertia of the aggregate shape about its x axis, in⁴

$$= \sum_{i=1}^n (I_{cx}^i + A_i d_{yi}^2) \quad (9)$$

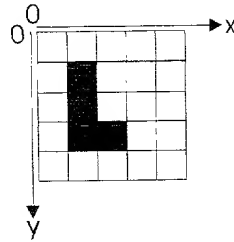
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$$= \sum_{i=1}^n I_{cx}^i + A \sum_{i=1}^n d_{yi}^2 \quad (10)$$

$$= n I_{cx}^i + \frac{A}{yres^2} \sum_{i=1}^n \left(y_i - .5 - \frac{1}{n} \sum_{i=1}^n (y_i - .5) \right)^2 \quad (11)$$

array is created where n is the number of preferred-color pixels. However the data is arranged, standard engineering formulas adapted for use with the arrangement are then used to develop the section properties.

EXAMPLE

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Figure 1 An example digital image with each square representing a single pixel, white signifying empty space and black as the preferred color

X	Y
2	2
2	3
2	4
3	4

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Figure 2 The corresponding array

The standard engineering formulations adapted to the array:

A = area of each pixel, in²

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$$= \left(\frac{1}{xres} \right) \left(\frac{1}{yres} \right) \quad (1)$$

where $xres$ and $yres$ are the resolution of the digital image in pixels/inch

I_{cx}^1 = the centroidal moment of inertia for each pixel about its x axis, in⁴

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$$= \frac{\left(\frac{1}{xres} \right) \left(\frac{1}{yres} \right)^3}{12} \quad (2)$$